WHAT IS CLAIMED IS:

1. A method of producing an array of at least two different polymeric ligands covalently bonded to a surface of a substrate, said method comprising:

(a) contacting blocked monomers to at least a first location and a second location of a substrate having a surface displaying functional groups under conditions sufficient for said blocked monomers to covalently bond to said surface in said first and second locations to produce a substrate surface displaying covalently bound blocked monomers;

(b) removing blocking groups of said blocked monomers in a functional group generation step in a manner such that said surface is not exposed to a triple phase interface line of a gas, solid and liquid; and

(c) reiterating steps (a) and (b) at least once to produce said array of at least two polymeric ligands.

2. The method according to Claim 1, wherein said functional group generation step (b) comprises sequentially contacting at least a portion of said surface with a plurality of different liquids.

3. The method according to Claim 2, wherein said plurality of different liquids includes at least an oxidizing fluid and a deblocking fluid.

4. The method according to Claim 3, wherein said plurality of different liquids further includes a wash liquid.

5. The method according to Claim 4, wherein said plurality of different liquids further includes a capping liquid.

6. The method according to Claim 2, wherein any two sequentially applied liquids of said plurality have a different density.

7. The method according to Claim 6, wherein any two sequentially applied liquids of said plurality have a density difference (A) of greater than zero.

8. The method according to Claim 2, wherein said plurality of liquids is sequentially contacted with said surface by displacing a previous liquid of said plurality with an immediately subsequent liquid.

9. The method according to Claim 8, wherein said displacing comprises flowing said immediately subsequent liquid across said surface in a manner sufficient to produce a stratified liquid interface between said immediately subsequent and previous liquids that moves across said surface.

10. The method according to Claim 10, wherein said plurality of liquids are flowed across said surface at a rate ranging from about 1 cm/s to about 20 cm/s.

11. The method according to Claim 10, wherein said method further comprises sensing movement of said stratified liquid interface as it moves across said surface.

12. The method according to Claim 1, wherein functional group generation step (b) occurs in a flow cell.

13. The method according to Claim 1, wherein said blocked nucleoside monomers are contacted with said surface by pulse-jet deposition.

14. The method according to Claim 1, wherein said functional group generation step (b) comprises sequentially contacting said surface in a flow cell with a plurality of different liquids in the following order:

(i) an oxidizing liquid;

(ii) a wash liquid;

(iii) a deblock liquid; and

(iv) a wash liquid;

wherein said plurality of liquids is sequentially contacted with said surface by displacing any previous liquid of said plurality with an immediately subsequent liquid.

15. The method according to Claim 14, wherein said displacing comprises flowing said immediately subsequent liquid across said surface in a manner sufficient to produce a stratified liquid interface between said immediately subsequent and previous liquids that moves across said surface.

16. The method according to Claim 14, wherein said plurality further comprises a capping liquid which is contacted with said surface between said oxidizing liquid and said deblock liquid.

17. A nucleic acid array produced according to the method of Claim 1.

18. A method of detecting the presence of a nucleic acid analyte in a sample, said method comprising:

(a) contacting a sample suspected of comprising said nucleic acid analyte with a nucleic acid array according to Claim 17;

(b) detecting any binding complexes on the surface of the said array to obtain binding complex data; and

(c) determining the presence of said nucleic acid analyte in said sample using said binding complex data.

19. A method of transmitting data from a first location to a second location a result from a reading of an array according to Claim 18.

20. A method according to Claim 19, wherein said second location is a remote location.

21. A method comprising receiving data representing a result of a reading obtained by the method of Claim 18.

22. A kit for use in a hybridization assay, said kit comprising:
a nucleic acid array produced according to the method of Claim 17.

23. The kit according to Claim 22, wherein said kit further comprises reagents for generating a labeled target nucleic acid sample.

24. An apparatus for synthesizing an array of biopolymers on the surface of a support, said apparatus comprising:
(a) a reaction chamber;
(b) a mechanism for moving a support to and from said reaction chamber;
(c) a controller for controlling the movement of said mechanism of step (b);
(d) one or more fluid dispensing stations in fluid communication with said reaction chamber;
(e) a controller for controlling said mechanism of (d) in a manner according to the method of claim 1;
(f) a mechanism for activating said fluid dispensing stations to independently dispense reagents to the surface of a support, said mechanism being cooperative with said mechanism of (d); and
(g) a controller for controlling said mechanism of (e), and (f) one or more additional chambers for conducting reactions that form part of said synthesis.

25. An apparatus according to claim 24 wherein said mechanism of (b) is a robotic arm.

26. An apparatus according to claim 24, wherein said holding chamber is a flow cell.

27. A computer-readable medium comprising:
programming for controlling the automated system of claim 24 according to the method of Claim 1.